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5      1.      **Field of the Invention**

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Currently, medical student training and tracking and accreditation review and tracking is labor intensive and paper intensive. Records must then be collected and data entered to



make the data accessible to computer tracking, report generation, and accreditation reviews.

Although, some systems exist to automate portions of this process, no system currently allows the unified data entry, validation and certification, tracking and accreditation of medical students and medical training facilities using a single database structure and a single interface to the database structure. Thus, there is a need in the art for a user friendly, server based system that allows medical students to directly enter their patient care data and/or laboratory training data, supervisors to directly track and verify student activities, medical schools to track student progress and performance in their programs and to evaluate program efficiency and effectiveness, and accreditation organizations to track student and school performance.

### **SUMMARY OF THE INVENTION**

The present invention provides a system implemented on a computer, preferably a server connected to an intranet or internet, for entering, tracking and verifying medical student patient and procedure activity data where the entered data is databased for retrieval and review by instructors, supervisors, faculty members, program directors, medical school and/or accreditation agencies. The system includes a graphical users interface (GUI) subsystem for interacting with a user having screens designed to facilitate data entry, a database subsystem for storing, manipulating and polling data and a logon subsystem to log in to the database subsystem via the GUI subsystem and verifying user identity or establishing new user identities.

The present invention provides a method implemented on a computer, preferably a server connected to an intranet or internet, including the step of logging onto the system, selecting a medical discipline, selecting a medical protocol and/or procedure within the selected discipline, time stamping the selection, entering data associated with the protocol and/or procedure in appropriate fields in a GUI screen associated with the protocol and/or procedure, logging off of system after completion of the protocol data entry. The method can also include the step of submitting the protocol data to the database after review by a supervisor and polling entered data, where the submitting step can include changing a status



of the entered data from a first state indicating initial data entry by a student and a second state indicating verification by an instructor. The submitting step can also include entering comments and levels of completion for student feed-back and/or protocol repeat or to repeat steps within the procedure.

5           The present invention also provides a method for automating an accreditation procedure including the steps of selecting an institution, retrieving protocol and/or procedure data, where the data evidences the protocol and/or procedures used by the institution to train and certify medical students. The method also includes the step of retrieving medical student data corresponding to each students performance on each protocol and/or procedure and  
10           comparing the protocol and student data to a standard to determine accreditation problems and/or deficiencies.

15           The present invention also provides a method for taking, storing and analyzing surveys used for the purpose of outcome evaluation, where faculty, students, graduates and employers or other related personnel may evaluate performance using standard evaluation instruments. Data acquisition protocols allow for immediate acquisition of statistical reports.

### **DESCRIPTION OF THE DRAWINGS**

20           The invention can be better understood with reference to the following detailed description together with the appended illustrative drawings in which like elements are numbered the same:

            Figure 1A depicts a block diagrams of a preferred embodiment of a start layout of the system of the present invention;

            Figure 1B depicts a block diagrams of a preferred embodiment of an assign global variable function of Figure 1A;

25           Figure 2 depicts a block diagram of preferred embodiments of the survey subsystems of Figure 1A;

            Figure 3 depicts a block diagram of preferred embodiments of the student subsystem of Figure 1A;

            Figure 4 depicts a block diagram of preferred embodiments of the Time Clock



function of Figure 3;

Figure 5 depicts a block diagram of preferred embodiments of the Daily Log function of Figure 3;

5 Figure 6 depicts a block diagram of preferred embodiments of the Clinical Competencies function of Figure 3;

Figure 7 depicts a block diagram of preferred embodiments of the Personal Data function of Figure 3;

Figure 8 depicts a block diagram of preferred embodiments of the clinician/instructor subsystem of Figure 1A;

10 Figure 9A&B depicts a block diagram of preferred embodiments of the staff subsystem of Figure 1A;

Figure 10A&B depicts a block diagram of preferred embodiments of the faculty subsystem of Figure 1A;

15 Figure 11 depicts a block diagram of preferred embodiments of the summaries subsystem of Figure 1A;

Figure 12 depicts a block diagram of preferred embodiments of the Program Surveys subsystem of Figure 1A;

Figure 13A-C depicts a preferred screen image for the main screen of a respiratory care embodiment of this invention;

20 Figure 14A-F depict a preferred set of screen images associated with the student Time Clock functions – Time In and Time Out functions of this invention;

Figures 15A-D depicts a preferred set of screen images associated with the instructor daily log function of this invention;

25 Figures 16A-G depicts a preferred set of screen images associated with the clinical competencies function of this invention;

Figures 17A-H depicts a preferred set of screen images associated with the faculty subsystem of this invention;

Figures 18A&B depicts a preferred set of screen images associated with the daily log



summary function of this invention;

Figures 19A&B depicts a preferred set of screen images associated with the student program resource survey result function of the summaries subsystem of this invention; and

Figures 20A-J depicts an example of a student program resource survey.

5                    **DETAILED DESCRIPTION OF THE INVENTION**

10                The inventors have found that an efficient and cost effective computer based system and methodology can be constructed that provides a uniform, single site computer based facility for entering, tracking, verifying and analyzing medical student and school performance on a set of standardized medical training protocols and/or procedures in a medical discipline. The system is designed to work with any medical or related health science discipline where students are certified according to a set of standardized training protocols and/or procedures. The system is preferably implemented on a single site server facility associated with an intranet or internet or other wide-band, distributed computer network which provides for remote entry by a large number of students, instructors, supervisors, faculty members and accreditation agency personnel, simultaneously.

15                The clinical database tracking system and program resource and outcomes evaluation system has been under development for some time. The clinical tracking system is used to replace the current voluminous paper system that programs are required to have in order to track student progress in learning clinical competencies. While students are in the clinic they can enter all of their therapeutic and diagnostic information and data into the computer, where it is recorded in a database subsystem. This allows the individual student and program faculty to have continuous and up to date information and data regarding the procedures the students have performed. In addition, all of the clinical evaluation forms are linked to the database subsystem in order to track how students are progressing in completing their competencies.

20                The program resource and outcomes evaluation system in an automated system that again allow students, program personnel, graduates and employees to enter evaluation information or data into a database subsystem via a global computer network such as the



internet or intranet networks connecting a select set of computers. This allows for program faculty to automate the data collection process used for accreditation annual reports and self-study programs.

There are actually three products that are used via the internet. The first product is the time clock. The time clock tracks students' time during clinical rotations. When a student arrives at a clinical site, the student logs in to the system via the internet instead of a physical time clock, phone or pager system. The time clock function is password protected for each student and can be programmed to identify the computer being used to enter data. The time is acquired from an atomic time clock internet site such as a site in Denver, CO. By utilizing this time clock function, students cannot alter their time of arrival or departure from a clinical site.

The second product is a clinical tracking database subsystem, which is capable of tracking student observations, performances and evaluations of clinical procedures. The old adage of "see one, do one, teach one" does not stand up in the legal system of this day and age. Therefore, if we can provide the clinical site with a system to document the number of times a student observes and performs a procedure we can help ensure that when the student is evaluated they have had to follow the necessary steps to prepare for the competency evaluation.

The third product is the program resource and outcomes evaluation system. This is an automated system that again allows students, program personnel, graduates and employers to enter evaluation information or data into a database subsystem via a global computer network such as the internet or intranet networks connecting a select set of computers. This allows for program faculty to automate the data collection process used for accreditation annual reports and self-study analysis and reports.

There are several benefits to this type of system: 1) program personnel have access to student data reports that display student progress in a concise format without having to weed through student notebooks and parse often difficult handwriting styles; 2) users have the capability for remote clinical sites to have direct access via the internet to the current



forms being used by a medical field such as a respiratory care program; 3) finally, whenever the database is upgraded to reflect changes in the field of respiratory care (or other disciplines), the system is automatically upgraded for all programs using the system.

The time clock helps circumvent students abusing time entry and exit hours and keeps track of the number of hours students spend in clinical rotations. This data becomes useful when reporting clinical hours to state agencies or clinical sites.

The old system consisted of student generated paper forms with lots of observations and performance records, and required clinical faculty to spend countless hours tabulating the data. The present invention is an application of a database program that has the capability of generating reports and, thus, providing faculty with a precise and up to date picture of how students are progressing in completing their required clinical competencies.

The standardized forms will provide increased anonymity, increased response rates to surveys and automated analysis of the results.

Each of these programs will reduce the amount of paper generated by the current process, greatly reducing faculty time in developing reports, and convert data storage from hardcopy to digital format.

The streamlining really comes to fruition on the reporting end. It is much faster and easier to generate a report of student clinical hours when using the database generated report. The same is true for clinical observations, performance, evaluations and program surveys.

Currently, some of the clinical forms are still done via the old paper method due to lack of training of personnel in different departments. An example of this would be students rotating through the cardiac catheterization laboratory. In our institution students spend a day or two observing in this area and the clinical staff are not part of the respiratory care department. The time it would take to orient them to using the system and setting up login and passwords would not be worthwhile for such a short duration of clinical rotations.

Students had a half-day training session that simulated clinical rotations and completion of the computer based forms. Initially, clinical instructors were oriented individually or in group training sessions, subsequently the clinical database orientation



system is performed during the new employee orientation process.

The system required user logon name and passwords specific to each student and clinical instructor for data entry. Data retrieval is currently linked to user logon status and access is restricted by middleware user protocol. For example, students can access only their own data and reports, while faculty can access all student data and view or generate individual or summative reports.

The major cost savings for the clinical database system comes from reduction in faculty hours in generating student clinical data reports. The program resource assessment and outcomes system reduces the man-hours needed to prepare survey packets and repeated mailings by using an internet based system. In addition, the major benefit is data reporting function that provides instant reports and automatic statistical analysis; and eliminates tallying the surveys generating data reports.

The present invention relates broadly to a system implemented on a computer and accessible over an intranet or internet, preferably a server connected to a intranet or internet, for entering, tracking, verifying, searching, certifying medical student patient and procedure activity data where the entered data is databased for retrieval and review by clinicians or instructors or supervisors, faculty members, program directors, medical school and/or accreditation agencies. The system includes a GUI subsystem for interacting with a user having screens designed to facilitate database interaction, data entry and display, a database subsystem for storing, manipulating and polling data and a logon subsystem to log in to the database subsystem via the GUI subsystem and verifying user identity or establishing new user identities.

The system can also include a middleware software program and routines for storing, manipulating and polling data and for performing most interactions with the database. The middleware allows the construction and storage of variables and variable list, certain statistics about variables such as means, median, standard deviations, or the like and allow for efficient and effective interaction with a rational database. The system also includes functions that allow students to login to the system, identify their instructors or clinicians,



the medical discipline or area of training and the medical procedure for which the student is training. The student logs into the system, the system verifies the student status, the student can then time clock in which establishes a record with a time stamp for that student.

Once the student completes the task, rotation or assignment,, the user selects a time out function that asks the student information about the clinician, hospital location and procedure. The system then enters the information into the database. The entry is then stored into the database in a non-validated state. A non-validated state means that the clinician or instructor has not reviewed the entry and certified or verified that the entry is accurate. The system also includes a daily log subsystem where a student can view daily log data, search for particular daily log data, add new daily log data into the database and generate summary reports. The system also includes a clinical competency subsystem where a student can view clinical competency data, search for particular clinical competency data, and generate summary reports. The system also allows the student to view and/or update the student's personal data.

The system also includes a clinician or instructor subsystem which allows the clinicians to validate student daily log and/or clinical competency data. The clinicians can also enter daily logs and enter comments about student daily log and/or competency data. The system also allows the clinicians to view and/or update their personal data.

The system also includes a staff subsystem that allows staff members to view, search, add, modify and/or delete records from the student and/or clinician entries.

The system also includes a summary or summary reports subsystem where time clock, daily log and/or clinical competency data can be searched, categorized, analyzed or manipulated to determine student activities, rankings, performance, timeliness or the like. The summary subsystem also allows faculty members to review student progress in the program, outcome variations between different training sites, and comparative evaluation of clinician/instructor performance. The data also allows faculty members to determine program deficiencies or other training inadequacies and to develop procedures to correct such deficiencies or inadequacies.



The system also includes a subsystem for performing surveys designed to allow users to comment on all aspects of the training program in a given institution or in all institutions in general.

Because all medical students have to be proficient in a standardized set of protocols and procedures, the system includes data entry forms for each such standardized protocol (protocols and procedures may be established by accreditation agencies or other regulatory agencies, or designed by individual institutions). Moreover, because the system is designed to store and track such data for all medical students having access to the system, the data can be analyzed for overall procedural and design errors in the standardized protocols or procedures.

The present invention also relates broadly to a method implemented on a computer, preferably a server connected to an intranet or internet, including the step of logging onto the system, selecting a medical discipline, selecting a medical protocol and/or procedure within the selected discipline, time stamping the selection, entering data associated with the protocol and/or procedure in appropriate fields in a GUI screen associated with the protocol and/or procedure, logging off of system after completion of the protocol data entry. The method can also include the step of submitting the protocol data to the database after review by a supervisor and polling entered data, where the submitting step can include changing a status of the entered data from a first state indicating initial data entry by a student and a second state indicating verification by an instructor. The submitting step can also include entering comments and levels of completion for student feed-back and/or protocol repeat or to repeat steps within the procedure.

The present invention utilizes time clock routines to track student activity in hospital rotation programs. The system allows the student to log onto the time clock routine upon start of a given clinical task, training exercise, training program, rotation, *etc.* in a given department with a particular clinician. The system allows the student to enter competency and daily log data into the data base and then time clock out of the system when the rotation program is complete. The records entered by the student are tagged as non-validated. These



records are then retrievable by the clinician or associated faculty member that can review the time clock data, the daily log data and the competencies data to certify that the student has attained the necessary time and proficiency in the protocol or procedure performed in a given rotation. The clinician or faculty member can leave comments and adequacy marks in the student records. If the record is sufficient, then the clinician or faculty member can validate the record or the student will have to pass back through the rotation to complete or redo the necessary protocol or procedure to attain validation.

Because the data is now stored in a database in a time relevant manner, statistics on programs, protocols, procedures, clinicians and/or faculty member evaluations can be performed in a time efficient and cost effective manner. The procedure simply corresponds to the execution of various functions in the system to attain evaluation statistics such as student time duration necessary to be certified in a given procedure, ranking of students, ranking of clinicians, ranking of faculty member, ranking of program disciplines and even ranking of facilities.

The present invention further relates broadly to a method for automating an accreditation procedure including the steps of selecting an institution, retrieving protocol and/or procedure data, where the data evidences the protocol and/or procedures used by the institution to train and certify medical students. The method also includes the step of retrieving medical student data corresponding to each students performance on each protocol and/or procedure and comparing the protocol and student data to a standard to determine accreditation problems and/or deficiencies.

### **General System Design and Layout**

The following figures illustrate the system design and layout of the present invention. Of course, the figures incorporate various flow diagrams and program layouts and structures, but to an ordinary artisan, these diagrams simply show or illustrate one particular way of programming the steps necessary for accomplishing the system functions.

Referring now to Figure 1A, a block diagram of a preferred system start process 100 of the present is shown to include a logon/login step 102 where a user enters a user name and



password. Because the database utilized in this system is a rational data base, the system makes use of so called a middleware product, such as Lasso, sold by BlueWorld, to interface with the rational database. The middleware allows the system to construct variable lists corresponding to the data in the database and to manage database polling functions and to streamline data entry and retrieval between the system and the database. The middleware also allows construction of certain auxiliary files, tables and database structures for storage and maintenance of variable lists and data associated with variable lists.

The entered name and password is then checked against a list of qualified users in stored in a middleware file in a middleware user test step **104**. If the user name and password do not match a qualified user name and password, then control is transferred along a NO branch **106** back to the logon step **102**. If the user name and password matches a member of the middleware list, then control is transferred along a YES branch **108** to a login activity step **110**. Next, the user again enters in the user name and password along with a status in a second logon step **112**. The status identifies the user as a student, clinician or a member of the faculty. Next, a global variable is assigned in an assign global variable step **114** and, then, the user name, password and status are compared to the database user list in a conditional step **116**. If the user name, password and status do not match an entry in the database list, then control is transferred along a NO branch **118** back to the logon step **102**; otherwise, controlled is transferred along a YES branch **120** to a branch step **122**, which directs the user to the appropriate routines for accessing, entering, deleting, modifying, manipulating and analyzing data in the database. In the case of the GUI, the user is transferred to GUI screen (preferably a web page) corresponding to a selection procedure, an entry form, a report, or the like. The branch step **122** sends the user to at least eight subsystems: an employer survey subsystem **200**, a graduate survey subsystem **220**, a student survey subsystem **240**, a program personnel survey subsystem **260**, a student subsystem **124**, a clinician subsystem **126**, a staff subsystem **128**, and a faculty subsystem **130**.

Referring now to Figure 1B, the global variable assignment routine **11.46** includes the step of creating a global variable identifier in an identifier step **150**. The user name is then



tested to determine whether a global variable is already established in a global variable test step 152. If no global variable matches the user, then control is transferred along a NO branch 154 to a log in step 156; otherwise control is transferred along a YES branch 158 to a check time of last activity step 160. If no activity has occurred in a period of time, preferably 15 minutes, then control is transferred along a NO branch 162 to an automatic logout step 164; otherwise control is transferred along a YES branch 166 to a check access privilege step 168. If the user is no privilege for the requested routine, then control is transferred along a NO branch 170 to a no access step 172; otherwise control is transferred along a YES branch 174 to allow access step 176.

Referring now to Figure 2, a preferred embodiments of process for handling surveys 200, 220, 240, and 260 are shown in block diagram form. The employer survey handling process 200 includes a display survey step 202. The user then fills out the survey in a fill out survey step 204. Once complete, the survey is added to the employer survey database in an added survey to database step 206. The graduate survey handling process 220 includes a display survey step 222. The user then fills out the survey in a fill out survey step 224. Once complete, the survey is added to the graduate survey database in an added survey to database step 226. Similarly, the student survey handling process 240 includes a display survey step 242. The user then fills out the survey in a fill out survey step 244. Once complete, the survey is added to the student survey database in an added survey to database step 246. And finally, the program personnel survey handling process 260 includes a display survey step 262. The user then fills out the survey in a fill out survey step 264. Once complete, the survey is added to the program personnel survey database in an added survey to database step 266. After the completed survey is added to the database, each survey routine 200, 220, 240, and 260 transfers control to a log out step 280.

Referring now to Figure 3, a block diagram of a preferred student subsystem 300 of the present is shown to include an activity selection step 302 where a user selects from a menu or from icons an activity the user desires to perform. The system then branches to the selected activity in a branch step 304, where control is transferred to a Time Clock function



400, a daily log function 500, a clinic competencies function 600 and a personal data function 700.

Referring now to Figure 4, a block diagram of a preferred time clock function 400 of the present is shown to include an activity selection step 402 where a user selects from a menu or from icons the activity the user desires to perform. The system then branches to the selected activity in a branch step 404, where control is transferred to a Time In function 410, a Time Out function 420, a clinical competencies function 440 and a personal data function 460. The Time In function 410 includes a get time step 412, where the server obtains the current time and date from an atomic clock site and creates a record for the student with a time stamp in a create record step 414.

The time out function 420 includes a select clinician and hospital area step 422, where the user selects the clinician responsible for certifying the clinical activity, the area in the health care system in which the activity is to be performed and the activity to be performed such as performing an EKG in the cardiac care unit. The time out function 420 then gets the current time in a get time step 424, where the time is from an atomic clock. The function 420 then searches for the latest incomplete user record in a find step 426 and updates the record with the clinician identity, activity and hospital area in an update step 428.

The view time clock record function 440 includes a generate and display step 442, where the function 440 generates and displays a list of all time clock records for all students. Of course, the search can be narrowed to the user's records only or to any other subset of students by appropriate search restriction generally invocable from screen icons or menus. The user can then select a particular record in a record select step 444 and the function 440 displays the selected record in a display record step 446.

The generate time clock summary function 460 includes a generate and display step 462, where the function 460 generates and displays a table of records along with statistical data associated with the tabulated records. The user can then select a particular record in a record select step 464 and the function 460 displays the selected record in a display record step 466.



Referring now to Figure 5, a block diagram of a preferred daily log function **500** of the present is shown to include an activity selection step **502** where a user selects from a menu or from icons the activity the user desires to perform. The system then branches to the selected activity in a branch step **504**, where control is transferred to a view records function **510**, a search records function **520**, an add record function **540** and a generate summary function **560**.

The view record function **510** includes a generate and display step **512**, where a list of all student daily log records are generated and displayed on the user's screen. The user can then select any record in a select step **514**, where upon the function **510** displays the selected record in a display step **516**.

The search function **520** includes an enter search criteria step **522**, where the user enters in a search string. The function **520**, at the middleware level, check the search string for errors, missing criteria or the like in a check for errors step **524**. If errors are found, control is transferred along a YES branch **526** to a flag error step **528**, where the middleware highlights the fields that are incomplete or highlights incorrect or inaccurate criteria and forwards control back to the entry step **522**. If no errors are found, then control is transferred along a NO branch **530** to a generate and display step **532**, where the middleware finds all records (hits) satisfying the search criteria, generates a list of all hits and transfers the list to the GUI that then displays the information in list form on the user's screen or display device. Once the list is displayed, the user can select a particular record or list entry in a select step **534** and the selected record is displayed on the screen in a display step **536**.

The add record function **540** includes a display data entry form step **542**, where the function **540** displays a window including all of the fields needed for a student to complete and add a daily log record. The student then fills out the form placing data/information in the relevant fields in a complete form step **544**. After the student completes the form, the record is checked for validation in a check validation step **546**, where the clinician can validate the daily log entry currently with the students completion of the form. If the record is validated, then control is transferred along a YES branch **548** to a set validate flag to ON



step 550; otherwise, control is transferred along a NO branch 552 to a set validate flag to OFF step 554. Once the validate flag is set to either a ON or OFF condition, the daily log record is entered into the database in a entry step 556.

The generate summary function 560 includes a select patient population step 562, where the student selects the type of patient population for which the student desires a summary. For example, if the student desires to look at daily log summaries for cardiac patients, then the student would select cardiac patient populations from patient population selection menus or icons or search string entries in the select patient population step 562. Once the student selects a desired student population, the function 560 generates a summary table of daily log data for the selected patient population in a generate step 564. The function 560 then displays the table along with statistics associated with the data stored in the daily log for which statistical data can be performed in a display table step 566. After the table is generated and displayed, the function 560 allows the student to select a particular record in a select record step 568 which is then displayed by the function 560 in a display selected record step 570.

Referring now to Figure 6, a block diagram of a preferred student clinical competencies function 600 of the present is shown to an activity selection step 602 where the student selects from a menu or icons the activity the student desires to perform. The system then branches to the selected activity in a branch step 604, where control is transferred to a view records function 610, a search record function 620, an add record function 640 and a generate clinical competencies summary data function 660.

Referring now to Figure 7, a block diagram of a preferred personal data function 700 of the present is shown to include a generate and display data table step 702 where the student's personnel data is displayed in one column and an adjacent column displays blank field where the student can enter updated data such as phone numbers, address information, or the like. The student then enters updated information in a make changes to data step 704. The function 700 then check the changes for errors in an error checking step 706. If errors are found, then control is transferred along a YES branch 708 back to the make changes in



data step **704**. The error checking step **706**, leaves correct change data ready for database updating and highlight incorrect or incomplete data for reenter by the student. If no errors are found in the changed data, then control is transferred along a NO branch **710** to a confirm update data step **712**. If the user confirms update, then control is transferred along a YES  
5 branch **714** to an update database step **716**, where the updated data is entered into the students personal data record. If the student does not confirm the changes, then control is transferred along a NO branch to the make changes step **704**. Of course, in all of these function, the student can logout of the system by activating a logout icon or by selecting the function from a selection menu.

10 Referring now to Figure 8, a block diagram of a preferred clinician or instructor subsystem **800** of the present is shown to include an activity selection step **802** where a user selects from a menu or from icons and activity the user desires to perform. The system then branches to the selected activity in a branch step **804**, where control is transferred to a daily log function **806**, a clinic competencies function **808** and a personal data function **850**. The  
15 daily log function **806** and the clinical competencies function **808** both proceed to a check validate step **810**, where student daily log records or competency records are checked to determine whether student records assigned to the clinician are present which have not been validated either by the clinician or a faculty member. If unvalidated records exist, then control is transferred along a YES branch **812** to a generate/display step **814**, where student  
20 records assigned to this clinician are scanned and non-validated records are collected and a list of non-validated records displayed. The clinician can then select an unvalidated record in a select step **816** and validate the record in a validate record step **818**, where the validation flag is set to ON from OFF.

25 Of course, the routine does not have to use a flag field, the routine can use any technique for designating the record a validated or unvalidated such as storing the validated records in one list and the unvalidated records in another list. Although the present flow chart shows only a single record being selected and then control transferred to an add new record step, control can also be transferred back up to the validate check step **810** along



optional path **819** until all unvalidated records are validated or of course the clinician can validate as many records as the clinician desires and go onto the add record set or to an enter record step.

If no records are unvalidated, then control is transferred from the validate step **810** along a NO branch **820** to a add new record step **822**, where the clinician can add a new daily log record or competency record. If the clinician desires to add a new record, then control is transferred along a YES branch **824** to a display data entry form **826** for either a daily log entry or a competency entry. The clinician then completes the form in a complete form step **828**. Once complete, the function **800** checks the data for errors, incomplete data or missing data in a check for errors step **830**. If errors exist, then control is transferred along YES branch **832** to a flag errors step **834**, where correct data is shown in the appropriate fields and errors, missing data, incomplete data are highlighted and control is transferred back to the enter data step **826**. If no errors are found or if all errors have been corrected, then control is transferred along a NO branch **836** to an enter validated records and/or added records to the database step **838**. The routine can also include a confirm database entry step. If no new records are to be added, then control is transferred from the add new record step **820** along a NO branch **840** to the enter data into the database step **838**.

Referring now to Figures 9A&B, a block diagram of a preferred staff subsystem **900** of the present is shown to include an activity selection step **902** where a user selects from a menu or from icons and activity the user desires to perform. The system then branches to the selected activity in a branch step **904**, where control is transferred to a view record function **910**, a search records function **920**, an add record function **940**, a modify record function **960** and a delete record function **980**.

The view record function **910** includes generate and display a list of all staff personal data records step **912**. Once the data records have been generated and displayed, the staff member can select a particular record in a select step **914**, which is then displayed by the function **910** in a display selected record step **916**.

The search records function **920** includes an enter search criteria step **922**, where the



staff member enters the search criteria desired. The function 920 then check the search criteria for errors in a check for errors step 924. If the search has errors, incorrect entries or incomplete entries, then control is transferred along a YES branch 926 to a error flagging step 928, where correct enters are left filled in and inaccurate or incomplete entries or required fields are highlight and control is sent back to the enter search criteria step 922. Once the search passes the error check step 922, control is transferred along a NO branch 930 to a generate and display step 932, where a hit list of records corresponding to the search are displayed. The staff member can then select a particular record in a select step 934 and the function 920 displays the selected record in a display step 936.

The add record function 940 includes a display data entry form step 942, which allows the staff member to fill in the required information in a complete form step 944. The function 940 then checks the form for errors in an error checking step 946. If an error is found in the data, then control is transferred along a YES branch 948 to a flag error step 950, where correct data is left alone and errant or incomplete data are highlight and control is sent back to the data entry step 942. If no errors in the data are found, then the check error step 946 transfers control along a NO branch 952 to an add record to the database step 954. After the record has been added to the database, the staff member is asked whether the member desires to update the data in the new record in a conditional update step 955. If the staff member does not desire to update the data in the new record, the control is transferred along a NO branch 956 to a continue step 958 or to any other process the staff member desires to invoke from pull down menus or icons associated with the window in which the update new record step 955 is displayed. If the staff member desires to update the data in the added record, then control is transferred along a YES branch 959 to a generate and display step 962 associated with the modify record function 960.

The modify record function 960 includes a generate and display a list of all staff personal data records step 962, where all records containing data about the staff member is assembled and displayed in a selectable list format. The staff member can then select a record in a select step 964. The function 960 then displays the selected record as a data entry



form in a display step 966. The staff member then updates the data by entering new data in any desired data entry field in the form in a complete form step 968. The updated data is then checked for errors in error checking step 970. If errors are found (errant data, inaccurate data or incomplete data), then control is transferred along a YES branch 972 to an flag error step 974 where correct data is left alone and errant, inaccurate or incomplete data is highlighted. After errors are highlighted, control is returned to the data entry step 966. If no errors are found, then control is transferred along a NO branch 976 to an update record in the database step 978.

The delete record function 980 includes a generate and display a list of all staff personal data records step 982. The staff member then selects a record to be deleted in a select step 984. The function 960, then requests the staff member to confirm the deletion in a confirm step 986. If the confirm step is negative, then control is transferred along a NO path 988 to a keep record step 990. If the staff member still wants the record desired, then control is transferred along a YES branch 992 to a save data from record step 994, where the data from the record is saved by the middleware routine in a deleted data table so that data deletion errors can be corrected later or scanned to determine what type of errors are being made so that functions can be augmented to reduce the incidence of such errors. After the data is save, the staff member is again asked if the data record is to be deleted in a second confirm step 995. Again, if the deletion is not to be made, then control is transferred along a NO branch 996 to the keep record step 990 and the middleware table is updated to remove the saved record corresponding to the record for which deletion has been aborted. If the staff member again confirms deletion, then control is transferred along a YES branch 997 to a go to step 998, which transfers control of the function to the add record function 940.

Referring now to Figure 10, a block diagram of a preferred faculty subsystem 1000 of the present is shown to include a select activity and branch to selected activity step 1002 where a faculty member selects from a list of functions: a personal data function 1004, a time clock function 1010, a daily log function 1012, a clinical competencies function 1014, a summary function 1100 and a program survey function 1200. The personal data function



1004 routines the system to a faculty personal data subsystem 1006 that is identical to the staff subsystem of Figures 9A and B except that the data is associated with a faculty personal data database instead of the staff personal data database. Because the functionality is identical, the functionality of the subsystem will not be repeated here with language changes from staff to faculty member.

The time clock, daily log and clinical competencies function 1010, 1012 and 1014, respectively, all allow the faculty member to select from five record functions: view record function 1020, search records function 1030, delete record function 1050, add record function 1070 and a modify record function 1090. The view record function 1020 includes a generate and display step 1022 which generates and displays a list of all data records. Once the list is displayed, the faculty member can select a given record from a select step 1024, which causes the selected record to be displayed in a display step 1026.

The search function 1030 includes an enter search criteria step 1032, where the faculty member enters a set of search criteria. The function 1030 then checks the search criteria for errors in an error checking step 1034. If errors are found, then control is transferred along a YES branch 1036 to a flag errors step 1038, where correct data is left alone and errant or incomplete data is highlighted and control is returned to the enter search criteria step 1032. If no errors are found, then control is transferred along a NO branch 1040 to a generate and display step 1042, where a hit list of all records satisfying the search criteria are displayed. The faculty member can then select a particular record in a select step 1044, which is displayed in a display step 1046.

The delete function 1050 includes a generate and display step 1051, where a list of all records is displayed. Once the list is displayed, the faculty member can select a particular record in a select record step 1052. The function 1050 then asks the faculty member to confirm the deletion in a confirm test step 1053. If the faculty member confirms the deletion, then control is transferred along a YES path 1054 to a save data step 1055, where data from record is saved in a middleware deleted data table. If the faculty does not confirm deletion in confirm step 1053, then control is transferred along a NO branch 1056 to a keep record



step **1057**. After the record data is save in step **1055**, the function **1050**, then again asks the faculty member to confirm deletion is a second confirm test step **1058**. If the faculty member decides to abort the deletion, then control is transferred along a NO branch **1059** to the keep record step **1057**, which also cause the saved data table to be updated to remove the saved data corresponding to the aborted deletion attempt. If the faculty member confirms deletion, then control is transferred along a YES branch **1060** to a delete record step **1061**, which removes the record from the database. Control is then transferred to the add function **1070** in a go to step **1062**.

The add function **1070** includes display data entry step **1071**, where a data entry form is displayed corresponding to the appropriate form for time clock data entry, daily log data entry and clinical competencies data entry. The faculty member then complete the appropriate data entry form **1072**. The function **1070** then check the entered data for errors in an errors step **1073**, where the data is checked for error and/or incomplete data entry. If errors exist, then control is transferred along a YES branch **1074** to an error flag step **1075**, where correct data is left alone and errant or incomplete data is highlighted and control is returned to the complete form step **1072**. If no errors exist in the entered data, then control is transferred along a NO branch **1076** to an add record to database step **1077**. After record addition, the faculty member can alter the date in an update new record step **1078**. If no alteration is needed, then control is transferred along a NO branch **1079** to an update record in database step **1089**. If the new record needs updating, then control is transferred along a YES branch **1080** to a generate and display step **1081**, where a list of all records is displayed. Once the list is displayed, the faculty member can select a particular record in a select record step **1082**. After selection, the data entry form corresponding to the data record is displayed in a form display step **1083**. The faculty member can then complete the form with updated information or data in a complete step **1084**. Again, the function **1070** checks the data for errors in a error checking step **1085**. If errors are found, then control is transferred along a YES branch **1086** to a flag error step **1087**, where correct data is left alone and errant or incomplete data are highlighted and control is returned to the complete form step **1084**. If



no errors exist, then control is transferred along a NO branch **1088** to an update database step **1089**, where the updated record information or data is stored to update the data in the database.

The modify function **1090** includes a test step **1091**, where the function **1090** determines whether the faculty member is in the daily log or clinical competencies subsystem because these two functions, unlike the time clock function, can include non-validated student records. If the records are time clock records, then control is transferred along a NO branch **1092A** to the generate display step **1081** of the add function **1070**. If the records are daily log or clinical competency records, then control is transferred along a YES branch **1093** to a validate test step **1094**, where the function **1090** checks to see if there are unvalidated records. If no unvalidated records exist, then control is transferred along a NO branch **1092B** to the generate display step **1081** of the add function **1070**. If unvalidated records exist, then control is transferred along a YES branch **1095** to a generate and display step **1096**, where a list of all records is displayed. Once the list is displayed, the faculty member selects a record to be validated in a select step **1097** record is validated in a set validate flag step **1098**, where the unvalidated record is set to validated. The newly validated record is then submitted to the database in an update database step **1099** and control is returned to the validate test step **1094**.

Referring now to Figure 11, a block diagram of a preferred summary subsystem **1100** of the present is shown to include a select activity and branch to selected activity step **1102**, where the faculty member selects a summary functions: time clock summary function **1104**; a daily log summary function **1106** and a clinical competencies function **1150**.

The time clock summary **1104** and the daily log summary **1106** include the same step which start with a select student or clinician step **1108**. Once the record class is selected, the function **1104** or **1106** generates and displays all associated records in a generate and display records step **1110**. Next, the faculty member selects a particular student or clinician in a second select step **1112**. Of course, the selection step may allow for numerous students or clinicians to be selected. Next, the faculty member selects a patient population in a third



select step **1114**. Of course all three selection steps **1108**, **1112** and **1114** can be combined and the generate and display step **1110** would not be necessary. Once all the selection are completed, the function **1104** or **1106** check for selection errors in an error checking step **1116**. If errors exist, then control is transferred along a YES branch **1118** to a flag error step **1120**, where correct data is unaffected, while errant and incomplete data is highlighted and control is returned to the select patient population step **1114**. If no errors exist, then control is transferred along a NO branch **1122** to a generate and display step **1124**, where a table containing all records corresponding to the selection criteria are displayed along with all performance data and statistical data associated therewith. The faculty member can then select a particular record in a select record step **1126** which is then displayed in a display step **1128**.

Referring now to Figure 12, a block diagram of a preferred survey subsystem **1200** of the present is shown to include a select activity and branch to selected activity step **1202** where the faculty member can select: a survey function **1204**, a numerical summary function **1240** of a comments function **1242**. The surveys function **1204** includes a view function **1210** and a search function **1220**. The view function **1210** includes a generate and display step **1212**, which generates and displays all relevant records. The faculty member can then select a particular record **1214** from the records which is then displayed in a display step **1216**. The search function **1220** includes an enter search criteria step **1222** followed by an error checking step **1224**. If errors are found, then control is transferred along a YES branch **1226** to a flag error step **1228**, where correct data is unaffected and errant and incomplete data is highlighted and control is returned to the enter search step **1222**. If no errors are found, then control is transferred along a NO branch **1230** to a generate and display step **1232** which generates and displays a hit list of records that correspond to the search criteria. The faculty member can then select a particular record in a select step **1234** which is then displayed in a display step **1236**.

The numerical summary function **1240** and comments function **1242** each include a select type step **1244**, where the faculty member selects the type of data desire, *e.g.*, student,



graduate, employee or program personnel. Once a selection has been made, the function 1240 and 1242 generates and displays a the selected records in a generate and display step 1246. The displayed data is obtained via the middleware which determines the count of each rating (1 to 5), percentage of each rating, the total number of responses, mean, median, standard deviations and other statistical data as well as the number of NA (not applicable) results and the number of blank entries. The faculty member can then select a particular record in a select step 1248 which is then displayed in a display step 1250.

### Graphic User Interface Layout

The following figures illustrate the GUI interface between the user and the system. The figure all relate to one embodiment of this system to respiratory care medical program. The figures are include for illustration of the GUI interface, input screen and function screens corresponding to the system conceptual flow chart described in the preceding section.

Referring now to Figures 13A-C, a preferred screen display 1300 for a system start process relating to a respiratory care program of the present is shown to include a window 1302. Within the window 1302, are six major subsystems: a public subsystem 1304 with corresponding function selectors 1306; a program resource surveys subsystem 1308 with corresponding function selectors 1310; a program evaluations subsystem 1312 with corresponding function selectors 1314; a students subsystem 1316 with corresponding function selectors 1318; a preceptors and clinical instructors subsystem 1320 with corresponding function selectors 1322; and an academic faculty section 1324 with accessible function selection area 1326 to all function and databases. The screen image 1300 also includes auxiliary web-links 1328 to traverse different parts of the web environment in which the system is installed. It should be recognized that these selection areas correspond to the function diagramed in Figure 1-12. The public subsystem was not discussed previously and simply allows the public to enter as a guest and review publically available information such as AV surveys. The other subsystems were described in the previous section and the selectors correspond to the functions available to different class of users. The only subsystem not shown in this figure is staff subsystem.



Referring now to Figures 14A-F, a preferred set of screen images associated with the student Time Clock functions – Time In and Time Out – is shown. Looking at Figure 14A, an enter screen display **1400** is shown, where the student has already selected a Log In selector of Figure 13B. The screen image **1400** includes an enter network password pop up window **1402** within a database selection window **1404**, which pops up whenever a user selects a subsystem or function that requires a name and password to attain entry. The student enters his/her name in a name field **1406** and password in a password field **1408** and hits the ok button **1410**. Of course, the user can abort the process by hitting the cancel button **1412**. Because the system is shown here operating under a Windows operating system using Internet Explorer, internet and window icons and pull down menus are also available to the user. Once the student user enters in name and password and hits the ok button, then the system displays a student Time Clock Log In screen **1420** as shown in Figure 14B. The Time Clock Log In screen **1420** includes a student select box **1422** and associated pull down menu **1424**, which allows the user identify himself/herself and a course select box **1426** and associated pull down menu **1428**, which allow the user to identify the appropriate course to which the Time Clock entry will ultimately associated. The screen **1400** also includes a send information button **1430**, which submits the entry to the Time In function and a clear form button **1432**, which clears the selection. Of course, the program can keep the student identity entered in the log in step allowing the student to skip the select student step. Once a completed form is submitted to the system, the Time In function outputs a confirmation screen **1440** as shown in Figure 14C. The confirmation screen **1440** includes a student identification area **1441** with associated commentary; a summary table **1442**; and a instruction comment area **1443**, which tells the user how to Log Out (Exit or Quit). The box **1442** includes a time and date in labeled entry **1444**, a time and date entry **1445**, a course label entry **1446** and a course entry **1447**. When the student exits or quits the browser or system, then the system output a Time Clock Log Out screen **1450** as shown in Figure 14D. The Time Clock Log Out screen **1450** includes a password entry box **1452**, where the student enter her/his password so that the Time Out entry can be matched to its corresponding Time



In entry. The screen **1450** also includes a Find My Login button **1454**, which submits the entry to the Time In function and a clear form button **1456**, which clears the selection. After the student enters his/her password, the system matches the Time Out entry with its corresponding Time In entry and outputs a Time Clock Log Out identification screen **1460** as shown in Figure 14E. The Time Clock Log Out identification screen **1460** includes an area selection box **1462** with an associated pull down menu **1464**, where the student selects a hospital area where she/he performed the task and a clinician or instructor using a first name box **1466** and a last name box **1468**. The screen **1460** also includes a send information button **1470**, which submits the entry to the Time In function and a clear form button **1472**, which clears the selection. Once the student has log out, the system outputs a Time Clock In/Out confirmation screen **1480** as shown in Figure 14F. The confirmation screen **1480** includes a student identification area **1481** with associated commentary; a summary table **1482**; and a instruction comment area **1483**, which tells the user how to Log Out (Exit or Quit). The box **1482** includes a time and date in labeled entry **1484**, a time and date in entry **1485**, a course label entry **1486**, a course entry **1487**, a time and date out labeled entry **1488**, a time and date out entry **1489**, a location label entry **1490**, a location entry **1491**, a total time labeled entry **1492**, a total time entry **1493**, a clinical instructor label entry **1494**, a instructor entry **1495**.

Referring now to Figures 15A-D, a preferred set of screen images associated with the instructor daily log function is shown for a student with validation by a clinician/instructor. Looking at Figure 15A, an enter screen display **1500** is shown, where the student has already selected the Daily Log selector of Figure 13B. The screen image **1500** includes an instructor identification box **1502** with associated pull down menu activation button **1504**, which allows the student to identify clinician; a student identification box **1506** with associated pull down menu activation button **1508**, which allows the student to identify herself/himself; and an area identification box **1510** with associated pull down menu activation button **1512**, which allows the student to identify the applicable area. The image **1500** also includes a Physician contact entry box **1514**, where the student enters the nature and duration of contact



and a description box **1516**, where the student enters any observation, opinions, attitudes or feeling. Looking at Figures 15B&C, the screen **1500**, after scroll down with scroll bar **1518**, also includes Data entry categories **1520** and associated observation fields **1522** and performance fields **1524** corresponding to the area and protocols within the area. The observation fields **1522** are filled out by the student and the performance fields **1524** are filled out by a clinician. The screen **1500** also includes a send information button **1526** and a clear form button **1528**. Figure 15C also demonstrates a clinical validating the daily log entry for the student after completion by entering the instructor's user name and password in a password pop up window **1530**. After validation a confirmation screen **1532** is displayed by the system.

Referring now to Figures 16A-G, a preferred set of screen images associated with the clinical competencies function is shown for a student with validation by a clinician/instructor. Looking at Figure 16A, a clinical competencies by unit and rotations selection screen **1600** is shown, where the student selects a particular unit and competency for a selection box **1602**. For example, if the student selects the Adult Critical Care unit selector **1604**, then the system outputs a adult critical care selection screen **1606** shown in Figure 16B, which includes a therapy group column **1608** with associated therapies **1610** and a specific competency column **1612** with associated competency selectors **1614**. As another example, if the student selects an Adult Floor Therapies selector **1616**, then the system outputs the adult floor therapy competencies screen **1618** shown in Figure 16C, which includes a therapy group column **1620** with associated therapies **1622** and a specific competency column **1624** with associated competency selectors **1626**. Now, if the student selects the nasal cannula selector **1628** in the oxygen therapy group **1630**, then the system outputs a nasal cannula data entry screen **1632** as shown in Figure 16D. The data entry screen **1632** includes a data identification box **1634**, an instructor identification box **1636**, with associated pull down menu **1638** and a student identification box **1640** with associated pull down menu **1642**. The data entry screen **1632** also includes a conditions description entry box **1644** and an additional comment box **1646**. If the clinician is not available for immediate validation and



evaluation, then the student can send the information to the database using a send information button **1648** or the student can clear the form using a clear form button **1650** as shown in Figure 16E. If the clinician is available, then the clinician can evaluate the student's performance using a summary performance evaluation box **1652** with associated pull down menu **1654** also as shown in Figure 16E. Once the clinician or student completes the form, then a user name/password pop up menu **1656** is displayed as shown in Figure 16F. The system then enters the data as either validated or invalidated and displays a confirmation screen such as a clinician confirmation screen **1658** as shown in Figure 16G.

Referring now to Figures 17A-H, a preferred set of screen images associated with the faculty subsystem of this invention is shown. Looking at Figure 17A, a main faculty selection screen **1700** is shown, where the faculty member has already selected the all database selector of Figure 13B. The screen **1700** includes selection window **1702**. The selection window **1702** includes a database identification column **1704** where the accessible database are listed and an options section **1706** where options associated with each database are listed. The first four identified databases (student, clinical preceptors, daily log and competency evaluations) are shown with four options View, Add, Search, and Modify/Delete. Some of the other database only include the View and Search options. If the faculty member selects the modify/delete option for any one of the database, then the system displays a modify/delete selection screen **1720** as shown in Figure 17B for modifying or deleting a student record. The modify/delete selection screen **1720** includes a first name field **1721**, a last name field **1722**, an ID field **1723**, an email field **1724**, an street address field **1725**, a city field **1726**, a state field **1727**, a zip code field **1728**, and a phone number field **1729**. The screen **1720** also includes a student database record list pop up window **1730** for selecting a student. The screen **1720** also includes a Modify button **1731**, a DELETE button **1732** and a Reset Form button **1733**. Looking at Figure 17C, a view time clock screen **1740** is shown which includes a student identification column **1741**, a clinical instructor identification column **1742**, a date column **1743**, a time in column **1744**, a time out column **1745**, total time column **1746**, a location column **1747** and a course column **1748**. Looking



at Figure 17D, a search time clock records screen **1750** is shown which includes a student identification box **1751** with associated pull down menu activation button **1752**, a clinical instructor identification box **1753** with associated pull down menu activation button **1754**, a date restriction box **1755** with associated pull down menu activation button **1756** for selecting date restriction operators, a date box **1757**, a location box **1758** with associated pull down menu activation button **1759**, a course box **1760** with associated pull down menu activation button **1761**, a send search request button **1762**, and a clear form button **1763**. Looking now to Figures 17E&F, a view screen **1765** is shown resulting from the selection of the View option for the competency evaluation database. The screen **1765** includes a student column **1766**, a clinical instructor column **1767**, a procedure column **1768**, a location column **1769**, an evaluation column **1770** and a date column **1771**. If the faculty member desires to look at a given record say the record of Sputum Bowl **1772** shown highlighted in Figure 17E, then the system outputs a screen **1773** showing the selected record. Looking now to Figures 17G&H, a search screen **1780** for searching the clinical competency database is shown. The screen **1780** includes a student identification box **1781** with associated pull down menu activation button **1782**, a clinical instructor identification box **1783** with associated pull down menu activation button **1784**, a patient identification box **1785** with associated pull down menu activation button **1786**, a date restriction box **1787** with associated pull down menu activation button **1788A** for selecting date restriction operators, a date box **1788B**, a summary box **1789** with associated pull down menu activation button **1790**, a location box **1791** with associated pull down menu activation button **1792**, a therapy group box **1793** with associated pull down menu activation button **1794**, a specific competency box **1795** with associated pull down menu activation button **1796**, a send search request button **1797**, and a clear form button **1798**. Once the search has been completed, the system outputs a hit list screen **1799** as shown in Figure 17H.

Referring now to Figures 18A&B, a preferred set of screen images associated with the daily log summary function is shown to include a summary of daily logs and evaluations screen **1800**. The screen image **1800** includes a selection box **1802** with associated pull



down menu activation button **1804**, which allows the user to select a student and a display summary button **1806**. Once a student is selected, the function outputs a corresponding daily log summary screen **1808** including an identification summary **1810** and a table **1812** having a procedures column **1814**, an observations column **1816**, a performances column **1818** and an evaluations column **1820**.

Referring now to Figures 19A&B, a preferred set of screen images associated with the student program resource survey result function of the summaries subsystem is shown. Looking at Figure 19A, a survey results screen **1900**, which identifies the survey results. Using a scroll control bar **1902**, the user can scroll down to obtain the results and statistics **1904** associated with each survey question **1906** of the selected survey.

Referring now to Figures 20A-J, an example of a student program resource survey **2000** is shown. The survey **2000** includes a set of instructions **2002** and a set of identification box **2004** with associated pull down menu activation buttons **2006**, which allows the student to identify herself/himself, the semester and year. The survey **2000** also includes a plurality of questions **2008** with ranked answers **2010** and a plurality of comment fields **2012**. The survey **2000** also includes a send survey button **2014** and a clear-start over button **2016**.

The system of the present invention is ideally suited for use on the internet where the world wide web allows students, clinicians and faculty members to be located at remote sites from each other. Thus, a user would jump on to the internet and establish contact with the server(s) on which the system of this invention resides. Once attached to the server, the user would login to the system and depending on the users name and password would be directed to the appropriate subsystems. The system of the present invention is preferably maintained on at single site which can comprise one or more servers, but the system can be implemented in a distributed form where the databases for each site reside at the site and not in a central repository. However, for security, tracking and accreditation reasons, a single site is preferred. A web based or linked system provides certain advantages for medical schools that have rotations or clinical competencies occurring in a number of different sites. A user



would simply attach to the world wide web, point to the web address for the server on which the system resides and interact with the system to log his/her training session. Additionally, any authorized user can attain access from any place and perform whatever function that user would be able to perform.

5           Suitable computer include, without limitation, any digital processing digital process subsystems or units (DPUs) capable of being used with the present invention include, without limitation, any apparatus capable of inputting, manipulating, altering and/or changing and outputting digital and/or analog data, *e.g.*, personal computers, laptop computers, desktop computers, palm computers, mainframe computers, minimainframe computers or any other  
10 digital and/or analog processing device that can receive data input, act on the data input via software and/or hardware and generate a corresponding output based on the input data and the internal hardware and/or software. Generally, the devices include a processing unit, a memory, *e.g.*, on the processing unit or on electronically connected memory chips, a mass storage device, *e.g.*, hard disks, solid state disks, tapes or the like, buses for interconnecting  
15 components, peripherals, *e.g.*, a display, a speaker, a mouse, a keyboard, a touch pad, a eye tracking device, a VR device, or the like, communication hardware and all necessary software including the generating software of the present invention. The necessary software will generally include, without limitation, a windowing operating system, communication software, driver software for all peripherals, a database program including any well known  
20 database program, a browser such as MS Explore, NetScape, or the like or other software or the like.

          All references cited herein are incorporated by reference. While this invention has been described fully and completely, it should be understood that, within the scope of the appended claims, the invention may be practiced otherwise than as specifically described.  
25   Although the invention has been disclosed with reference to its preferred embodiments, from reading this description those of skill in the art may appreciate changes and modification that may be made which do not depart from the scope and spirit of the invention as described above and claimed hereafter.